R E P O R T R E S U M E S

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EFFECTS OF SPECIAL TRAINING ON THE ACHIEVEMENT AND ADJUSTMENT OF GIFTED CHILDREN.

BY- HAMPTON, NELLIE D.
STATE COLLEGE OF IOWA, CEDAR FALLS

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AN ATTEMPT WAS MADE TO DEVELOP AND EVALUATE AN ADMINISTRATIVELY PRACTICAL EDUCATIONAL PROGRAM FOR INTELLECTUALLY GIFTED PUPILS IN SPARSELY POPULATED AREAS. THREE GROUPS OF APPROXIMATELY 60 FIFTH-GRADE SUBJECTS EACH WERE IDENTIFIED FOR THE STUDY. ONE GROUP (EXPERIMENTAL) WAS TRANSPORTED DAILY TO A CENTRAL LOCATION FOR AN 8-WEEK SUMMER SESSION, WHICH HAD CURRICULUM ADAPTED TO THE SPECIAL ABILITIES OF THESE CHILDREN AND TO THE KINDS OF SCHOOLS THEY ATTENDED DURING THE REGULAR YEAR. THE TWO OTHER GROUPS, DIFFERING IN THEIR AWARENESS OF INCLUSION IN THE EXPERIMENT, WERE SET UP FOR COMPARATIVE CONTROL PURPOSES. POST-TESTING WAS DELAYED APPROXIMATELY 1 ACADEMIC YEAR AFTER THE EXPERIMENTAL GROUP COMPLETED THEIR SPECIAL SUMMER TRAINING. THE TEST BATTERY WAS DESIGNED TO MEASURE ACADEMIC SKILLS, SOCIAL AND EMOTIONAL SECURITY, NEEDS AND PROBLEMS, INTERESTS, AND CLASSROOM REPUTATION. PRE-EXPERIMENTAL NULL HYPOTHESES HAD BEEN ESTABLISHED ON ALL THESE VARIABLES, STATING THAT THERE WOULD BE NO SIGNIFICANT DIFFERENCES IN THE POST-TEST RESULTS AMONG THE THREE GROUPS. FOR THE MOST PART, THESE HYPOTHESES WERE SUBSTANTIATED. ONLY IN THE ACADEMIC AREAS DID THE RESULTS GENERALLY FAVOR THE EXPERIMENTAL GROUP. (JH)

THIRD REPORT

Effects of Special Training on the Achievement and Adjustment of Gifted Children

Nellie D. Hampton

State College of Iowa
Cedar Falls, Iowa

1962

Effects of Special Training on the Achievement and Adjustment of Gifted Children

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Nellie D. Hampton
Professor of Education
State College of Iowa
Cedar Falls, Iowa

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Preface

Contained herein is the report of the third and final phase of a larger study which has been conducted under contracts with the Cooperative Research Branch of the United States Office of Education. Each phase has included a special summer session for selected gifted students and a study of these children and comparable controls a year later. The reports of the first two phases (summer sessions of 1958 and 1959) were published in 1960 and 1961. This is the report of the 1960 summer session and the follow-up of the students in 1961.

It is impossible to acknowledge properly all who have contributed to this endeavor. I do wish, however, to express my gratitude to the public school administrators, supervisors, and classroom teachers for their gracious cooperation and to my colleagues at the State College of Iowa for their assistance so willingly and freely given.

I am indebted especially to Dr. C. L. Bishop, Head, Department of Education and Psychology, State College of Iowa, for his administrative help and guidance; to Dr. A. N. Hieronymus, Professor of Education, College of Education, State University of Iowa, for his assistance with the testing and the scoring of the *Iowa Tests of Basic Skills;* and to Dr. Gordon Rhum, Professor of Education and Coordinator of Research, State College of Iowa, for his helpfulness throughout the investigation and particularly for the reading and criticism of this manuscript.

Finally, I wish to express my sincere appreciation to Dr. Harry LaPine, Assistant Professor of Education and Psychology, State College of Iowa, who has been most helpful throughout the entire undertaking. He was responsible for all the computations included in this report and assisted with much of the writing.

Nellie D. Hampton

January, 1962

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Chapter 1

The Problem and the Hypotheses

1. The Importance of the Problem

Interest in the gifted and in providing more adequately for them in our educational system is gaining momentum daily as evidenced by the appearance of increasing numbers of books, pamphlets, and articles dealing with this segment of our school population. For many years we have accepted an educational responsibility for the handicapped, but there has existed with many a somewhat vague feeling that special provision for the gifted was undemocratic. French has called the gifted the forgotten element in our schools (12:v)* and Johnson has described them as ". . . the most underprivileged and undereducated group of students in America" (24:56). However, as we have been faced with a shortage of trained personnel to meet the needs of our postwar economic expansion and to enter into the space, missile, and armament competition for national security, leaders are coming to the realization that a democracy must foster excellence if it is to survive and that we must give the gifted the opportunity to which they are entitled for the full development of their special abilities. DeHaan and Havighurst, writing in 1957, indicated that in their opinion and under present conditions less than half of the gifted children in our schools will "realize their potentialities and become distinguished persons, contributing in an outstanding way to the welfare of their society and gaining for themselves the satisfaction of excellent performance" (7:19).

Dael Wolfle in his report on *America's Resources of Specialized Talent* reported that "fewer than half of the upper 25 percent of all high school graduates ever earn college degrees; only six out of ten of the top 5 percent do" (56:269). Also, Dr. Conant in his opening remarks to the NEA Invitational Conference on the Academically Talented Secondary School Pupil stated that "some 15-20 percent of a typical American comprehensive high school . . . should be going to college" (39:16). Undoubt-

* Numbers in parentheses are used to refer to sources listed in the bibliography. The number preceding the colon indictaes the reference cited and the number following the colon indicates the page number on which the quotation appears.

edly we do have a large potential of intellectual resources which we fail to utilize to the fullest because of lack of training.

The failure of many bright students to continue in school has been attributed in part to the lack of stimulation in the school program. In fact, Wolfle (12:24) feels that lack of interest is the chief reason why these students fail to go to college or quit before graduation. All too often the top ten percent is held back to the level of much of the other ninety percent, frustrated, bored, and feared by both parents and teachers whom they outstrip in capabilities. Terman indicated his opinion of the importance of stimulation in the school program when he stated that "no method or combination of methods for the gifted will succeed that does not awaken their intellectual ambition" (40:18). In discussing educational causes for talent waste, the committee preparing *Education of the Gifted* also expressed the same idea in this fashion: "Sometimes curriculum offerings are restricted in scope; sometimes the quality of instruction is poor; sometimes the books and other equipment are insufficient or of poor quality; but probably the most frequent type of educational inadequacy is the failure to challenge the gifted students to achieve up to capacity" (9:29). Later in the same publication the statement was made that "some human talent is wasted because the schools fail to identify, to challenge, to hold, or to educate adequately some of their gifted students" (9:86).

Passow also has indicated that he feels that as yet "few schools have adequately met the challenge" (44:4). Likewise, Shannon states that "many have talked about the problem of the gifted but have done nothing about it" (49:70).

An examination of the literature reveals also that the procedures presently being employed for the education of these intellectually gifted generally are confined to districts in heavily populated areas and many of the suggestions and methods frequently are impractical or impossible in small communities or rural areas. Since almost fifty percent of the population of the United States, and thus roughly fifty percent of the children who would be classified as gifted or talented, is found in rural areas and in communities of fewer than 10,000 (53:1-5), it is extremely important that some educational method or technique be devised which can be administered successfully to provide more adequately for these children in such areas.

Havighurst, writing in *Education for the Gifted*, states that

> of special importance is the development of programs for gifted children in the small towns and the villages of the country which do not have the numbers of students or the variety of resources to allow a variegated special program for gifted youth. These small-to-medium-sized communities can do much more than they now do, given interest and imagination on the part of teachers and school administrators (40:10-11).

II. Statement of the Problem

The program at the State College of Iowa was set up in an attempt to develop and to evaluate an administratively practical educational program for intellectually gifted pupils in sparsely populated areas. A group of such gifted pupils was transported daily to a central location for an eight-week summer session. The curriculum devised was adapted to the special abilities of these children and to the kinds of schools which they attended during the regular year. There is no indication that a similar procedure would be impractical in small communities and rural areas where sufficient numbers of such children could be gathered in a center.

Significant features of this study included the following characteristics:

1. Three groups of approximately sixty subjects each, or a total of one hundred eighty subjects, were identified for the study.
2. Approximately equal numbers of boys and girls were selected.
3. There were two control groups, differing in their awareness of inclusion in the experiment, with which to compare the experimental group.
4. The subjects for each of the three treatment groups were selected equally from four readings levels.
5. The posttesting was delayed approximately one academic year after the special summer session for the experimental group.

III. The Hypotheses to be Tested

The major purpose of this study was to investigate the effects on achievement and adjustment of the training which was given to a group of gifted children enrolled in a special summer program. The study was so designed that the experimental group could be compared with two control groups, one in which the subjects had been notified that they had qualified for participation in the special session but had not been selected, and one in which the subjects were unaware of their performance on the qualifying tests. The chief hypotheses to be tested were that there would be no differences between any two of the three groups over-all or at any of the reading achievement levels in any of the following factors:

1. Achievement as measured by the *Iowa Tests of Basic Skills* (35,36).
2. Changes in adjustment as measured by the *SRA Junior Inventory* (47).
3. Changes in interests as measured by the *What I Like to Do* inventory (51).
4. Changes in personal-emotional security as measured by the *Institute of Child Study Security Test* (*The Story of Jimmy*) (16).

5. Scores on locally adapted tests of critical thinking, expression, and library research skills.
6. Changes in reputation in the peer group as indicated by a locally prepared instrument.

Secondary hypotheses concerned with intra-group differences were also being tested. The hypotheses were that there would be no differences on the measures used between the levels within any treatment or between the boys and the girls at any level within any treatment.

Chapter 2

Related Research

Interest in gifted children and in the proper educational program for them is not an entirely new development in this country. It was in 1868 that Superintendent Harris of St. Louis, Missouri, introduced his program of flexible and frequent promotions for the academically able students in the St. Louis schools. Similar administrative practices soon were established in other schools, followed closely by variations including double promotions, skipping grades, special classes, special schools, credit by examination, and other such accelerative techniques of which many are still in practice today.

The various programs for providing for the intellectually gifted may be classified broadly into three types:

1. Acceleration—in which the gifted cover essentially the same standard curriculum as do other students but at a more rapid pace or in which the gifted skip certain grades in the school program.
2. Ability grouping—in which the gifted children are separated from other students in special schools, special classes, or special sections for at least a part of the time and methods and materials providing a broad, enriched program are planned for them.
3. Enrichment in the regular classroom—in which the gifted children follow the same general curriculum as their age-grade groups but their teachers provide extra experiences to give breadth and depth of understanding.

The desirability and the effectiveness of these various approaches

have been the subjects of much discussion and disagreement. All three have the common objective of providing a better educational program for talented children and each has had its era of popularity and its advocates. However, no one of them has been demonstrated to be outstandingly more successful or definitely more desirable than any other. Nor are they mutually exclusive in their use. The Educational Policies Commission makes the distinction that enrichment is a policy rather than a plan and can be carried out with acceleration or ability grouping (9:56). Likewise acceleration may occur in conjunction with such grouping.

From the inception of the flexible promotion plan in 1868 until early in the twentieth century, acceleration in its various forms was the characteristic technique used to provide for the exceptionally able student. However, there still existed a gap between the real achievement level of the talented student and his actual grade placement. Lewis M. Terman, for many years the outstanding proponent of the procedure, pointed out in 1925 that although the typical gifted child was accelerated more than 40 percent above his chronological age in actual knowledge of subject matter taught, he was accelerated only 14 percent in grade placement (50:306).

Witty and Wilkins surveyed the research dealing with acceleration prior to 1933 and concluded that much of it to that date was "fragmentary, poorly conceived, inadequately controlled, and vaguely reported" (55:346). Engle, Hobson, Justman, Miller, and Wilkins are a few who have studied the academic progress of accelerated students since that time (11, 20, 25, 38, 54). Students in their studies were compared in some cases with matched non-accelerates and in other cases with the members of their grade group. The progress of the accelerates was reported variously as satisfactory, better than the control group, and not significantly different from the control group. In no instance was the academic achievement of the accelerates lower than the achievement of the group with which they were being compared. Also a number of other studies conducted since that time have consistently concluded that a moderate degree of acceleration seems to be advantageous for carefully selected students and Reynolds feels there is a growing need to consider the merits of this type of provision for able students and for more experimental studies of a carefully controlled nature (52).

Educators of the 1920's, however, began to feel that by acceleration the bright child was being cared for only in terms of his greater rapidity of learning and that his abilities for greater depth and breadth of understanding were being neglected. In addition they became concerned over the problem of adjustment which might grow out of the disharmony among the rates of physical, emotional, social, and intellectual develop-

ment. If a gifted individual were accelerated equivalent with his mental age or his academic achievement, then he would be out of place socially and emotionally and likely to feel insecure and inadequate. Though Terman had pointed out that in actual knowledge of subject matter taught the typical gifted child is accelerated more than 40 percent (50:306), he also pointed out that this acceleration in physical development is not likely to exceed 10 percent and in social development it is not likely to be over 20-30 percent (4:173).

The social and physical handicaps concurrent with sufficient acceleration to care for the gifted child have been described by Hollingworth in this fashion:

> If the child be accelerated in grade status so that he is able to function intellectually with real interest, he will be misplaced in other important respects. A child of eight years graded with twelve-year-olds is out of his depth socially and physically, though able to do intellectual work as well as they can. These problems come out clearly when we consider that seats and desks planned for twelve-year-olds will not fit him; that he will always be the last one chosen in athletic contests; that no one will know how to treat him at class parties; that the teacher will be prone to complain of his manual work, such as handwriting; and that he will be emotionally immature in comparison with older classmates (21:5-6).

Professor Hollingworth became one of the principal advocates of ability grouping and the removal of gifted children from the "lock-step systems" of the usual public school. She was convinced that homogeneous grouping was the answer to the education of gifted children wherever the population of such children was large enough to make such grouping possible. She began her studies in 1922 in an attempt to show the advantages of such an administrative device. In experimenting with children seven and one-half to nine and one-half years old in Public School 165 in New York City she found no significant differences in accomplishment in subject matter between the gifted children in her segregated groups with the special program and those in the non-segregated group. The achievement of these children seemed to be superior wherever they were. She concluded that "the advantages to be hoped for from the homogeneous grouping of gifted children lie not so much in the expectation of greater achievement in the tool subjects of reading, arithmetic, and spelling as in an enrichment of scholastic experience with additional intellectual opportunities" (17:261).

Others followed her in attempting to show the superiority of special schools, special classes, and special groupings which separated out the gifted with a specially made enriched curriculum for them, but results were not consistent. Subjective standards sometimes rated control groups higher on traits involving social and emotional growth, and achievement scores frequently showed no significant differences between groups. Nelson and Carlson in 1945 found essentially the same thing that Hol-

lingworth had earlier; i.e., that special class placement did not affect scores on achievement tests and that bright students achieved above grade placement in regular classes as well (42).

Since the 1930's enrichment in the classroom has gained increasing popularity. Surveys indicate the favor shown the procedure by both administrators and classroom teachers, though frequently the educators are unable to describe their programs very adequately or support their opinions with experimental evidence (6, 15, 19). Passow, in discussing the lack of evidence to support the practice, suggests that "perhaps difficulties in designing research in this area account for the shortage . . . . Schools might fruitfully conduct action research in this area to get needed evaluative data to support the arguments advanced in favor of this wide practice" (40:204).

Although the progress of groups of gifted students using the Winnetka plan under Washburne (41:247-61) and self-administering units of enrichment under Dransfield (8) was shown to be satisfactory in those situations, Carroll, writing in 1940, stated that

> the principal objection to enrichment for gifted children in the heterogeneous class is that in most cases it fails to work. Teachers are human beings with all the failings of human beings. Consequently, most of them prefer teaching procedures which require the least amount of time. They find it much easier to treat the class as a unit rather than as a loosely organized group of sub-groups and individuals. Mass education is infinitely simpler than individual teaching (5:246-7).

The Educational Policies Commission ten years later pointed out that

> successful operation of differentiated enrichment . . . is greatly facilitated by having small classes, ample and varied instructional materials, flexible curriculum and standards, and versatile teachers. Such a combination of favorable conditions is as rare as it is desirable. Lacking it, the ideal of enrichment in heterogeneous classes is hardly ever attained satisfactorily (9:59).

During the past ten years there has been a deluge of material describing numerous programs in operation which are combinations of or variations on the three major types. Some of these have been summer programs and others have been regular school-year programs. Though claims have appeared from time to time as to the advantages of these summer programs to supplement the regular program for the gifted students, there have been few attempts to present substantiating evaluative data. The programs generally have been of the enrichment type previously discussed in which students were offered opportunities in foreign languages, music, art, research in a chosen area, and recently mathematics and science. Thus, by nature, they would be subject to the same difficulties which have hampered evaluative research of regular year enrichment programs.

One attempt at evaluating certain outcomes of a summer program oriented around academic enrichment was that reported by Burkland in

1959 (3). He conducted an investigation in California in which students from third through seventh grades participated in a six-week summer program. The children were followed during the succeeding school year and gains in achievement, attitudes, and health status were studied. The investigator found that some of the experimental groups made significantly more growth in reading and arithmetic than their controls; that there was no difference between the groups in language, in manifest anxiety, or in health status; and that in attitudes the differences favored the controls.

The investigation set up at the State College of Iowa was designed also to evaluate certain outcomes of an experimental summer session. The program might be described as a combination of special ability grouping and enrichment. The participants were all children with an IQ of 120 or above who were brought together in relatively homogeneous reading groups for the summer term and a special curriculum was designed to help these children utilize their abilites more fully. The classes were small, the variety and supply of instructional materials were almost unlimited, and the teachers were thought to be extremely competent and versatile. At the end of the summer term the children returned to their usual heterogeneous classes in their regular schools.

Chapter 3

The Procedure

I. The Subjects

The subjects chosen for this experiment were children who had completed the fifth grade in the spring preceding the experimental summer session and who had achieved an IQ of 120 or above on the *Henmon-Nelson Tests of Mental Ability, Revised Edition,* Form A for grades 3-6 (30). All children came from the same community. Three groups of sixty each were selected and designated as Groups G, H, and J. The group which attended the special summer session was designated Group G. Members of Group H were notified that they were eligible for the special session but had not been chosen in the random selection. On the other

hand, those in Group J were unaware that they had qualified for the program until the time of the final achievement testing one year later.

All fifth grade pupils in the schools involved had been tested also with the *Stanford Achievement Test*: *Reading*, Form LM for grades 5-6 (28). The scores of those who met the required level on the mental test were arranged in a distribution which was in turn divided into fourths. Then from each of the four reading levels thus identified seven boys and eight girls were selected randomly for each of three treatment groups. The treatment groups thus established then did not suffer significantly overall with respect to reading.

Analyses indicated that the means of the four levels within each treatment group were differentiated from each other at greater than the .001 level of significance.

The characteristics of the three groups according to intelligence, age, and reading ability are given in Tables I, II, and III on pages 14 and 15.

The sixty children comprising Experimental Group G were transported daily to a single center for a special eight-week summer session (1960) which involved a specially planned curriculum. The children were divided equally into three instructional groupings of best, middle, and poorest readers on the basis of scores on the Stanford test. Means of the resulting groupings of twenty were different from another at the .001 confidence level. One teacher was assigned to each of the three groups of twenty children and a fourth teacher served as coordinator and helped the children with special problems in reading.

II. The Teachers

The teaching staff consisted of four elementary teachers, two men and two women. The two men and one woman were assigned to the three class groups and the second woman served as the coordinator and helper. These were all experienced teachers who were considered highly successful and well above average in the school systems in which they were employed during the regular academic year. The four teachers and the project director met for a pre-school workshop for four days prior to the summer session and met frequently during the session to discuss the work, to revise plans, and to do further planning.

III. Data-Gathering Devices and Procedures

Rapid learners eligible for this study were identified by the *Henmon-Nelson Tests of Mental Ability, Revised Edition*, Form A, for grades 3-6 (30). The tests were administered to all fifth graders in the schools involved in February, 1960.

The *Stanford Achievement Test*: *Reading*, Form LM for grades 5-6

TABLE I

Intelligence Quotients on the Henmon-Nelson Tests of Mental Ability, Revised Edition

Intelligence Quotient	Frequency								
	Boys[a]			Girls[b]			Both[a]		
	Group G	Group H	Group J	Group G	Group H	Group J	Group G	Group H	Group J
141–143	0	1	0	0	2	0	0	3	0
138–140	0	1	1	2	1	0	2	2	1
135–137	2	0	0	1	2	1	3	2	1
132–134	3	3	1	0	2	2	3	5	3
129–131	3	2	3	4	6	4	7	8	7
126–128	9	2	6	6	3	7	15	5	13
123–125	6	7	10	10	9	8	16	16	18
120–122	5	12	7	9	7	10	14	19	17
Total	28	28	28	32	32	32	60	60	60
Mean[c]	126.61	125.25	125.43	125.12	127.38	125.31	125.82	126.38	125.37
Standard Deviation[c]	4.46	5.92	4.51	5.35	6.51	4.02	4.93	6.23	4.18

[a] Differences between means fell below the .20 level of significance with differences between variances taken into account by the Cochran-Cox method where necessary.

[b] Differences between means fell below the .10 level of significance with differences between variances taken into account by the Cochran-Cox method where necessary.

[c] Ungrouped data.

TABLE II

Chronological Ages in February, 1960

Chronological Age	Frequency								
	Boys[a]			Girls[b]			Both[a]		
	Group G	Group H	Group J	Group G	Group H	Group J	Group G	Group H	Group J
133–138 mos.	1	3	5	4	5	5	5	8	10
127–132 mos.	14	12	6	13	12	8	27	24	14
121–126 mos.	13	13	17	15	15	19	28	28	36
Total	28	28	28	32	32	32	60	60	60
Mean[c]	126.86	127.04	127.04	127.50	127.56	126.88	127.20	127.32	126.95
Standard Deviation[c]	3.33	3.60	4.21	3.56	3.66	3.79	3.41	3.58	3.92

[a] Differences between means fell below the .50 level of significance.

[b] Differences between means fell below the .20 level of significance.

[c] Ungrouped data.

TABLE III

Modal-Age Grade Equivalents on the Stanford Achievement Test: Reading

Grade Equivalent	Frequency								
	Boys[a]			Girls[a]			Both[b]		
	Group G	Group H	Group J	Group G	Group H	Group J	Group G	Group H	Group J
10.5–10.9	0	1	0	0	2	0	0	3	0
10.0–10.4	0	1	3	1	3	2	1	4	5
9.5– 9.9	1	1	0	1	1	2	2	2	2
9.0– 9.4	1	4	0	5	2	3	6	6	3
8.5– 8.9	5	3	7	3	1	4	8	4	11
8.0– 8.4	7	4	4	6	7	5	13	11	9
7.5– 7.9	4	3	2	4	6	6	8	9	8
7.0– 7.4	7	9	7	7	5	4	14	14	11
6.5– 6.9	2	0	1	5	1	2	7	1	3
6.0– 6.4	0	1	3	0	3	3	0	4	6
5.5– 5.9	1	1	0	0	0	1	1	1	1
5.0– 5.4	0	0	1	0	0	0	0	0	1
4.5– 4.9	0	0	0	0	0	0	0	0	0
4.0– 4.4	0	0	0	0	1	0	0	1	0
Total	28	28	28	32	32	32	60	60	60
Mean[c]	7.85	8.02	7.92	7.99	8.06	8.02	7.92	8.04	7.98
Standard Deviation[c]	.86	1.19	1.27	1.03	1.52	1.21	.94	1.35	1.22

[a] Differences between means fell below the .20 level of significance.
[b] Differences between means fell below the .50 level of significance with differences between variances taken into account by the Cochran-Cox method where necessary.
[c] Ungrouped data.

(28) was used as the pretest measure of reading ability and was the basis for classifying the children into the four sub-groups. These tests were administered to all fifth graders in the schools involved in April, 1960.

Tests of needs and problems, social and emotional security, children's interests, and a sociometric-choice test covering social, emotional, and intellectual traits as rated by classmates were administered as pretests in the spring of 1960. The tests, which were readministered in the spring of 1961 as posttests, were the following:

1. The *SRA Junior Inventory* (47)
2. The *Institute of Child Study Security Test,* Elementary Form (16)
3. *What I Like To Do* (51)
4. A sociometric-choice test of the "Who do you think?" type.

The *Iowa Tests of Basic Skills* (35, 36) and some locally adapted tests were used as the final measures of achievement and were administered in the spring of 1961. The eighth grade level of the *Iowa Tests of Basic Skills* was used for all areas except arithmetic to minimize any ceiling effects which might influence the scores of childern of the capability of those in the experiment. However, it seemed inadvisable to test above grade level in arithmetic so the scores obtained in the regular January testing conducted by the public schools were used as the criterion scores for that area.

The locally adapted tests were made up of items selected with permission of the authors from the *Iowa Tests of Educational Development* (33) and earlier editions of the *Iowa Tests of Basic Skills.* The tests were entitled "Test I: Library Research," "Test II: Critical Thinking," and "Test III: Expression."

Test I was designed to measure library research skills and contained thirty items covering the purposes of parts of a book, general knowledge of the types of sources to use to find particular kinds of information, use of the library card catalogue, and knowledge of certain specific reference sources.

Test II, "Critical Thinking," was composed of two poetry and eight prose reading selections varying in length from one to five paragraphs. Each selection was followed by three to eight multiple-choice items which demanded very careful and informed analysis of the material. There was a total of sixty items in this test.

Test III was constructed to test correctness and appropriateness of expression and contained fifteen items. It was made up of a passage of three paragraphs written in "spread-out" form in which certain parts were underlined and numbered. Some of the underlined sections contained errors in capitalization, punctuation, and usage; some were examples of poor writing; and some were entirely correct. The student had

to decide if a change were needed and, if so, which of the suggested ones was the proper revision.

The "Sociometric Choice" test was a scale consisting of a collection of fifteen brief statements describing certain typical intellectual and personal-social behaviors of intellectually gifted children. The test response required of the student was that he choose the three of his classmates best described by each behavioral statement.

Study of the instrument revealed that it did appear to differentiate rather successfully between groups of rapid learners and groups of nongifted. The rapid learners from the summer session were matched for sex with students in their own classrooms who had scored below 120 on the intelligence test and distributions were made of the two sets of pretest scores. Though the ranges of the scores for the two groups were very similar, the median for the gifted group was higher than the median for the nongifted and the chi-square test of homogeneity revealed that the two distributions of scores were heterogeneous at the .01 level of significance.

IV. Procedure for Analyzing the Data

The general plan of this investigation was to study the differences among the treatment groups, both over-all and level-by-level, in achievement, in awareness of personal needs and problems, in feelings of security, in interests, and in classroom reputation among peers. In making these comparisons analysis of variance was applied to the change scores (difference between pre- and posttests) for all tests other than those of academic achievement for which final scores only were available. The design used was a three-dimensional type in which one dimension consisted of the three separate treatments, a second consisted of the dichotomous classifications according to sex, and the third of the four contiguous reading levels. The error term was the within cells mean square. In accordance with the importance of subclass findings in the present study, differences between individual pairs of criterion score means were examined for significance.

Homogeneity of subclass variances was examined. For every analysis of variance the ratio of the largest to the smallest of the twenty-four subclass (cell) variances was computed and checked for degree of significance (46:49-51, 179). If the ratio fell below the .05 confidence level the assumption of homogeneity of variance was confirmed for the variable concerned. In such cases, with regard to the effect of treatments, reading levels, sexes, or any interaction, the value of an F-ratio required for significance was that given in the table of F for the .05 confidence level; and the following formula was employed to obtain the standard

error of the difference between the means of the two treatments, subclasses, or subgroups, based on n_1 and n_2

$$\sigma^2_{(M_1-M_2)} = ms_{(error)} \left(\frac{1}{n_1} + \frac{1}{n_2} \right).$$

Then, the ordinary t-test was used to determine the significance of the differences between means, with the degrees of freedom found in ms_{error} (see 32:243f.).

However, if the assumption of homogeneity among subclass variances was not confirmed, an F-ratio as large as would be needed ordinarily for significance at the .025 level was required in determining the .05 level for each of the main effects and interactions.

When there was a lack of homogeneity among subclass variances and t-tests were to be employed, the formula for the standard error of the difference between means shown above was replaced by appropriate substitute versions as follows:

1. In testing the significance of the difference between the means of any two treatments, the standard error of the difference between means employed in the t-test was based upon the standard error of the mean of each treatment as obtained by a method allowing for stratification by levels within the treatment group. This adjusted the t-test for similarities between means resulting from having matched subsamples at corresponding reading levels on the control variable, reading ability.
2. When testing the significance of the difference between means of a pair of subclasses or subgroups from different treatments, the F-test of the equality of variances was applied. If the value derived was not significant at the .05 confidence level the variances were considered alike. Then the standard error of the difference between the means was computed from data on the two subclasses or subgroups and used in the ordinary t-test with the modification needed to adjust for any similarity between the criterion means resulting from matching subsamples on the control variable.
3. If the result of the F-test indicated that a pair of subclass or subgroup variances was unlike, the significance of the difference between the means was determined by using the modified form of the t-test devised by Cochran and Cox (see 10:295-9) plus, if needed, the modification for similarity between criterion means resulting from matching on the control variable.

A secondary investigation involved intra-treatment comparisons between levels and between sexes at each level. The major factor in determining the appropriate form of the t-test for assessment of the significance of the difference between means for a particular variable was

whether there was homogeneity among all cell variances, just as in the primary investigation. When there was homogeneity, the t-test was performed in the identical manner as it had been for subclasses and subgroups in the primary investigation. When the array of variances lacked homogeneity, the significance of the difference between the means for two levels within a treatment was determined by 1) obtaining the standard error of the difference between means based on the data from the two subgroups and 2) using this statistic in the ordinary t-test, or, if necessary, in the modified t-test devised by Cochran and Cox (10:295-9). In determining the significance of the difference between the means of the sexes at a given level within a treatment when the array of variances lacked homogeneity the forms of the t-test were chosen on the same bases as in the inter-treatment comparisons of subclasses in the primary investigation.

V. The Curriculum

The special eight-week session planned for the experimental group had as general objectives the improvement of certain attitudes, techniques, and knowledges which would help rapid learning children to utilize their abilities more fully. The more specific objectives were stated as follows:

1. To develop and improve the ability of each child to think independently and creatively.
2. To develop an appreciation for reasoning and proof.
3. To develop an understanding of the importance of objectivity and evidence.
4. To develop skill in logical reasoning.
5. To arouse and develop an increased awareness of, an appreciation for, and a respect for the role of the intellectual in the process of mankind.
6. To develop skill in the use of library materials.
7. To improve the ability to do research—to select a problem, define it, and modify it; to survey, select, and obtain information from many sources; to analyze information, organize, synthesize, and evaluate it.
8. To cultivate in each child a sense of responsibility to himself and to the group.
9. To guide each child to a better understanding of himself, his peers, his family, and other associates.
10. To improve reading rate and comprehension.

The curriculum during the early part of the session was designed somewhat loosely around a central theme or unit chosen by the teacher in each room. The unit for the group of top readers was "The News-

paper," for the middle group of readers "The Atom," and for the lowest readers "Democracy." These units served as vehicles for teaching the useful tools, techniques, and methodology of research. Skills pertaining to using the library card catalogue and other sources for locating information, preparing bibliographies, taking notes, and outlining were taught as the children became ready for them and needed them.

A library manual was prepared locally to aid in the teaching of these skills. The manual not only gave help on the general use of libraries, but also gave suggestions on such research techniques as choosing a topic, selecting material, taking notes, quoting or paraphrasing material, organizing, and writing the paper.

During the latter half of the session the children concentrated on writing research papers on topics of their own choosing. This activity served as a further avenue for developing research skills and for practicing the skills being taught.

Specific periods were set aside, the number varying from two to five per week, for a direct attack on the improvement of reading rate and comprehension. Each teacher planned these periods to fit the individual needs of the pupils in his or her classroom. The types of lessons varied greatly, with the entire class rarely working on the same material. During some periods a class might be broken into small groups with the classroom teacher working with some of them and the curriculum coordinator working with others. At other times each child might be working independently with the *SRA Reading Laboratory* materials, the *Readers Digest Skill Builders,* materials located in reading textbooks, or some locally prepared materials as the teacher saw the need.

Experiences in planning and evaluation were provided as an integral part of the program. Each group, with the aid of the teacher, planned each day. Each child, also with the aid of the teacher, made daily, weekly, and bi-weekly evaluations of his activities and progress.

Planned periods of activities designed to foster ideational fluency and redefinition ability also were incorporated in the program two to three times per week. Alternating with these periods was a study of human relations in which the children were guided into discussions and role-playing of such things as their own behavior, their peer relationships, and their family relationships.

Chapter 4

Findings

As indicated in Chapter III, each of the three treatment groups was composed originally of sixty subjects who had been selected from four reading levels. Thus in each treatment were seven boys and eight girls at each of the levels or a total or 180 subjects. For the present analyses, however, the investigators desired to use equal numbers of boys and girls and equal numbers of subjects at each reading level. In order to achieve this equality each subclass (cell) of girls was reduced to seven by the random method and the total number of subjects was thereby reduced from 180 to 168. Three of these subjects moved from the school district before any posttests were administered, but for 165 subjects complete data were obtained with the exception of a few isolated scores unobtainable because of temporary illnesses. However, the technique of replacing a missing observation with a dummy value equal to the cell mean as proposed by Li (see 31:209-12) permitted retention of n's of seven in all twenty-four subclasses without the necessity of dummying in more than one score in a subclass or more than five for any variable and with virtually no weakening of the variance analysis design.

I. Academic Skills

The *Iowa Tests of Basic Skills* (35, 36) were the principal measures employed for the assessment of academic skills. The criterion measures used for all areas except arithmetic were the grade-equivalent scores obtained on the eighth grade level tests administered in May, 1961. The criterion measures for arithmetic were the grade-equivalent scores obtained on the sixth grade test in January of 1961. Decimals were eliminated from the scores for the variance analyses by multiplying each score by ten.

Three locally adapted tests, the tests of "Library Research," "Critical Thinking," and "Expression," also were used as posttest measures of status in certain academic skills. The criterion score for each test was the number of correct responses from the May, 1961, posttesting.

Iowa Tests of Basic Skills

Findings from the analyses of scores on the ITBS *(Iowa Tests of Basic Skills)* are presented in Tables IV and V on pages 23 and 24.

Inspection of Table IV reveals that the general trend was for the performance of the experimental group (Group G) to be better than that of either of the other groups. Group G was the superior treatment in all of the comparisons with either of the other two groups in which the difference reached the .05 level of significance. Also, Group G had a larger mean than Group H in 65 percent of the subclass comparisons, in 90 percent of the comparisons of the boys and the girls, in 60 percent of the comparisons by level but with sexes combined, and in 100 percent of the comparisons of over-all treatment means. When contrasted with Group J, Group G had the larger mean in 67 percent of the subclass comparisons, in 70 percent of the comparisons by sexes separately, in 60 percent of the comparisons by level with sexes combined, and in 60 percent of the over-all treatment comparisons.

Since one of the major emphases of the summer program was the improvement of reading skills, it is of particular interest to note that approximately two-thirds of the subclass superiorities of Group G were in the areas of vocabulary and reading comprehension and that the only significant over-all difference between treatments was the superiority of Group G over Group J in reading comprehension pointed up in Tables IV and V.

Reference to Table V also indicates that reading level had a significant effect on achievement in all the areas tested (one of which was reading). Criterion score means for each reading level, all treatments combined, ranked in accordance with the level based upon the *Stanford Achievement Test: Reading*. Two other significant *F*-ratios in Table V point up the superiority of all the girls over all the boys in Language Skills and the interaction between reading level and sex in Work-Study Skills in which the girls at the two lower reading levels did not perform in a manner consistent with the general trend.

Of added interest in this study were comparisons of Groups H and J. As a part of the total design the possible influence of being notified of above-average ability was being investigated. Subjects in Group H were notified simultaneously with Group G of their high standing on the selector test, but subjects in Group J were given no indication of their relationship to the study. The results of the analyses of performances on the ITBS indicated no over-all significant differences between these two groups for boys and for girls separately, or for the sexes combined.

TABLE IV

Means of Scores on the Iowa Tests of Basic Skills

Area[a]	Level	Mean Boys Group C	Mean Boys Group H	Mean Boys Group J	Mean Girls Group C	Mean Girls Group H	Mean Girls Group J	Mean Both Group C	Mean Both Group H	Mean Both Group J
Vocabulary	I	10.34	10.13	9.56	10.41	10.20	10.01	10.38	10.16	9.76
	II	9.13	9.61	9.30	8.99	9.44	9.21	9.06	9.53	9.26
	III	9.00	8.37	8.94	8.89	8.41	8.84	8.94	8.39	8.89
	IV	8.51	7.56	7.67	7.70	7.33	7.57	8.11	7.44	7.62
	All	9.25	8.92	8.87	9.00	8.85	8.91	9.12	8.88	8.89
Reading Comprehension	I	10.73	10.89[b]	9.80	10.36	10.54	10.10	10.54	10.71[b]	9.95
	II	9.61	9.37	8.91	9.73	9.57	9.99	9.67	9.47	9.45
	III	9.70	9.17	9.03	8.96	8.64	8.41	9.33	8.91	8.72
	IV	7.91	7.67	7.60	7.53	7.51	7.00	7.87	7.59	7.30
	All	9.49[b]	9.28	8.84	9.22	9.07	8.88	9.35[b]	9.17	8.86
Language Skills	I	10.50[b]	8.69	10.07[b]	10.84	10.34	10.93	10.67[b]	9.51	10.50[b]
	II	8.81	9.23	9.21	9.76	9.83	9.76	9.29	9.53	9.49
	III	9.11	8.10	8.29	8.44	8.61	9.14	8.78	8.36	8.71
	IV	7.60	7.29	7.04	7.99	8.67	8.81	7.79	7.98	7.93
	All	9.01[b]	8.32	8.65	9.26	9.36	9.66	9.13	8.84	9.16
Work-Study Skills	I	11.13[b]	9.81	10.71	10.43	10.67	10.39	10.78	10.24	10.55
	II	9.80	10.07	9.39	9.77	9.73	9.63	9.79	9.90	9.51
	III	8.99	9.53	9.47	8.36	8.70	8.03	8.67	9.11	8.75
	IV	8.51	7.91	7.79	9.21	8.24	8.29	8.86[a, b]	8.08	8.04
	All	9.61	9.33	9.34	9.44	9.34	9.08	9.52	9.33	9.21
Arithmetic Skills	I	8.94[b]	7.41	8.91[b]	8.51	8.81	9.01	8.73	8.11	8.96[b]
	II	8.01	8.30	8.24	8.04	7.81	8.17	8.02	8.06	8.20
	III	7.43	7.99	7.69	7.37	7.00	7.29	7.39	7.49	7.49
	IV	7.41	7.46	7.36	7.49	7.03	7.61	7.45	7.24	7.48
	All	7.95	7.79	8.05	7.85	7.66	8.02	7.90	7.73	8.03

[a] Eighth grade tests for first four areas administered in May, 1961; sixth grade arithmetic test administered in January, 1961.
[b] Different from the corresponding mean of Group H at the .05 level of significance.
[c] Different from the corresponding mean of Group J at the .05 level of significance.

TABLE V

ANALYSES OF VARIANCE OF SCORES ON THE IOWA TESTS OF BASIC SKILLS

Source of Variation	df	Mean Square					F				
		V	R	L	W	A	V	R	L	W	A
Treatments (A)	2	103.79	355.88	168.88	140.43	131.33	.91	3.66*	1.13	1.37	1.58
Reading Levels (B)	3	4,199.52	5,849.15	4,264.59	3,956.05	1,376.78	36.88*	60.15*	28.51*	38.51*	16.55*
Sexes (C)	1	36.21	90.05	2,461.01	81.48	28.34	.32	.93	16.45*	.79	.34
AB	6	131.90	46.66	161.92	133.58	59.22	1.16	.48	1.08	1.30	.71
AC	2	30.50	37.66	279.36	24.45	3.38	.27	.39	1.87	.24	.04
BC	3	60.09	217.24	173.48	392.55	127.31	.53	2.23	1.16	3.82*	1.53
ABC	6	13.64	47.40	98.24	104.08	151.94	.12	.49	.66	1.01	1.83
Within-cells	140*	113.88	97.24	149.59	102.72	83.19					
						V	R	L	W	A	
Total of Sums of Squares						29,900.01	33,254.26	39,175.26	29,263.80	17,640.40	

Key: V-Vocabulary, R-Reading Comprehension, L-Language Skills, W-Work-Study Skills, A-Arithmetic Skills.
* For Arithmetic the df were 139.
* Significant at the .05 level.

However, the scattered significant subclass superiorities and the general trend of greater over-all means slightly favored Group J.

Secondary hypotheses were related to intra-group comparisons with respect to differences between levels and differences between boys and girls. The ITBS are measures of achievement and were highly related to the *Stanford Achievement Test*: *Reading* which was used to determine the levels; thus differences in performance on the ITBS from level to level were found to be much as expected. With only one minor exception (Group H in Language Skills) Level I in each treatment performed higher than Level II and significantly so in nine out of fourteen times, higher than Level III in every instance (significant in 13 out of 15), and significantly higher than Level IV in all cases. Level II likewise performed better than Level III in every instance, though seldom significantly higher, and higher than Level IV in almost all cases but significantly so in only five instances. In general, then, differences did exist from level to level in the order in which the levels had been established and the differences between Levels I and II were significant more often than the differences between Levels II and III or between III and IV.

The examination of performances of boys and girls in Group G revealed no significant differences and no consistency in superior performance except at Level III where the boys exceeded the girls in all five areas of the test. The boys in Level III of Groups H and J also showed some tendency to perform better than the girls of the same level. In Groups H and J also the girls of Level I tended to excel the boys though seldom to a significant degree.

Locally Adapted Tests

Results from the analyses of the tests of "Library Research," "Critical Thinking," and "Expression" are reported in Tables VI and VII on page 26. An examination of these tables indicates again that the performance of Group G was in general superior to that of the other two groups. The significant F-ratio for treatments reported in Table VII directs attention to the significant superiority of G over both H and J on the test of Library Research. Also, inspection of Table VI reveals that all significant findings, either at subclass levels or over-all, favored Group G. Additional inspection of the means reveals that G had a larger mean than H in 71 percent of the subclass comparisons, in 83 percent of the comparisons by the sexes separately, in 75 percent of the treatment comparisons by level, and in all of the over-all treatment comparisons. The percentages in the comparisons with Group J ranged from 54 percent for subclasses to 83 percent for sexes considered separately. Thus in comparisons with either of the two control groups, Group G possessed the larger mean substantially more than 50 percent of the time.

TABLE VI

MEANS OF SCORES ON THE LOCALLY ADAPTED SCHOLASTIC TESTS

Test	Level	Mean Boys Group G	Mean Boys Group H	Mean Boys Group J	Mean Girls Group G	Mean Girls Group H	Mean Girls Group J	Both Group G	Both Group H	Both Group J
Library Research	I	22.14[a]	17.29	19.86	24.00	21.43	21.29	23.07[a b]	19.36	20.58
	II	16.43	18.71	17.57	22.00[a b]	18.00	18.57	19.22	18.36	18.07
	III	15.86	16.43	17.00	18.57	16.14	17.43	17.22	16.28	17.22
	IV	17.71[a b]	12.29	12.57	16.71	15.86	15.71	17.21[a b]	14.08	14.14
	All	18.04[a]	16.18	16.75	20.32[a b]	17.86	18.25	19.18[a b]	17.02	17.50
Critical Thinking	I	43.29[a b]	35.57	33.00	40.71	39.29	36.86	42.00[b]	37.43	34.93
	II	34.14	32.29	31.86	31.71	30.43	33.86	32.92	31.36	32.86
	III	29.43	30.00	34.00	29.71	28.86	30.00	29.57	29.43	32.00
	IV	26.57	25.29	25.00	25.43	27.29	25.57	26.00	26.29	25.28
	All	33.36	30.79	30.96	31.89	31.47	31.57	32.62	31.13	31.27
Expression	I	9.00	8.00	8.57	9.57	9.00	9.71	9.28	8.50	9.14
	II	7.00	7.57	8.00	7.57	7.29	8.29	7.28	7.43	8.14
	III	7.71	6.00	6.71	7.43	8.43	8.43	7.57	7.22	7.57
	IV	6.71	6.43	5.86	5.86	7.00	6.43	6.28	6.72	6.14
	All	7.60	7.00	7.28	7.61	7.93	8.22	7.60	7.47	7.75

[a] Different from the corresponding mean of Group H at the .05 level of significance.
[b] Different from th ecorresponding mean of Group J at the .05 level of significance.

TABLE VII

ANALYSES OF VARIANCE OF SCORES ON THE LOCALLY ADAPTED SCHOLASTIC TESTS

Source of Variation	df	Mean Square Library Research	Mean Square Critical Thinking	Mean Square Expression	F Library Research	F Critical Thinking	F Expression
Treatments (A)	2	72.04	38.38	1.14	7.35[a]	.95	.23
Reading Levels (B)	3	260.70	1,087.40	47.63	26.60[a]	26.78[a]	9.47[a]
Sexes (C)	1	139.34	.15	16.10	14.22[a]	.00	3.20
AB	6	10.74	61.87	2.03	1.10	1.52	.40
AC	2	2.37	20.74	4.02	.24	.51	.80
BC	3	4.23	21.67	3.44	.43	.53	.68
ABC	6	24.31	24.02	2.09	2.48[a]	.59	.42
Within-cells	140	9.80	40.60	5.03			

[a] Significant at the .05 level.

Total of Sums of Squares	Library Research	Critical Thinking	Expression
	2,665.25	9,644.94	908.55

The significant F-ratio for reading levels on these three tests, indicated in Table VII, again reflects the positive relationships between reading ability and each criterion. The significant F-ratio for sexes on the Library Research test calls attention again to the superiority of the girls over the boys. The girls likewise excelled the boys on the test of Expression though not at the level required for significance.

No significant differences were found between Groups H and J though, as with the ITBS, the observed differences tended to be in favor of J. This latter group had the superior mean in all over-all comparisons of the two groups and in about 60 percent of the subclass comparisons.

Much the same as was true of the intra-group differences on the ITBS was also true on the locally adapted tests. Level I achieved higher means than any other level, Level II performed higher than Levels III and IV with one exception, Level III was superior to Level IV, and in many cases the differences were significant except for the differences between Levels II and III. There was again a tendency pervading all three groups for the girls to surpass the boys at Level I more often than at any other level and for differences between sexes at any level to be non-significant.

II. Social and Emotional Security

The *Institute of Child Study Security Test* (16) afforded a measurement of two variables in the social-emotional area, Security and Consistency. This test was administered both as a pretest and as a posttest, and the change from the first to the second testing was the criterion score. A constant of 40 was added to each score in the analysis of variance computations to eliminate negative numbers.

The means of change scores and the results of the variance analyses are shown in Tables VIII and IX (page 28). It should be pointed out that the few negative scores appearing in Table VIII were merely decreases from the scores of the previous year and were not indicative of any below-normal status on this test. At posttesting the boys and the girls of all three treatments scored above the median for the norms population in both consistency and security.

There were no significant findings resulting from the analyses of the scores on this instrument and an examination of the means reveals no really consistent pattern of observed superiority. Group G showed the greatest mean gain over-all on one of the two areas of the test and the least over-all gain on the other. Examination of subclass means discloses similar inconsistencies in the relative amounts of change. However, it may be of interest to note that the subjects of all treatments combined at the highest level of reading (Level I) made the least gain on both areas of the test when sexes were considered separately or together. When the sexes were compared regardless of treatment the gains by boys exceeded those of the girls.

TABLE VIII

MEANS OF CHANGE SCORES ON THE INSTITUTE OF CHILD STUDY SECURITY TEST

Sex	Level	Mean*					
		Consistency			Security		
		Group G	Group H	Group J	Group G	Group H	Group J
Boys	I	- 5.00	8.71	8.43	-1.29	4.14	3.29
	II	11.71	11.86	12.14	5.57	5.86	9.43
	III	16.86	13.29	7.14	7.86	13.86	4.57
	IV	9.00	5.29	13.43	3.29	3.43	5.86
	All	8.14	9.79	10.28	3.86	6.82	5.79
Girls	I	7.86	3.14	- 1.29	2.00	1.57	1.29
	II	12.00	1.43	12.00	6.29	.71	5.00
	III	10.14	2.86	2.71	3.00	2.29	1.00
	IV	12.29	4.43	11.43	5.71	.71	11.43
	All	10.57	2.96	6.21	4.25	1.32	4.68
Both	I	1.43	5.92	3.57	.36	2.86	2.29
	II	11.86	6.64	12.07	5.93	3.29	7.22
	III	13.50	8.08	4.92	5.43	8.08	2.78
	IV	10.64	4.86	12.43	4.50	2.07	8.64
	All	9.36	6.38	8.25	4.06	4.08	5.23

* All differences between means fell below the .05 level of significance.

TABLE IX

ANALYSES OF VARIANCE OF CHANGE SCORES ON THE INSTITUTE OF CHILD STUDY SECURITY TEST

Source of Variation	df	Mean Square		F*	
		Consistency	Security	Consistency	Security
Treatments (A)	2	127.26	24.01	.56	.29
Reading Levels (B)	3	366.69	128.61	1.62	1.53
Sexes (C)	1	334.34	184.38	1.48	2.19
AB	6	186.18	100.50	.82	1.19
AC	2	315.88	130.36	1.39	1.55
BC	3	113.02	134.97	.50	1.60
ABC	6	125.80	21.33	.56	.25
Within-cells	140	226.60	84.16	...	...
				Consistency	Security
Total of Sums of Squares				36,255.63	13,797.24

* All values fell below the .05 level of significance.

Group J (the unnotified control group) made greater gains over-all than Group H (the notified control) on both areas of the test though observed subclass superiorities were about equally divided between the groups.

Examination of intra-treatment changes on this instrument revealed that the students did not gain in the rank order of their reading levels, for in general Level I tended to show the least gain of any of the levels and Levels II and III tended to demonstrate the greatest gains. Though these differences between levels were not significantly large, the tendency of Levels I and IV to gain least, regardless of treatment, and of Levels II and III to gain the most, may reflect types of insecurities concomitant with being either a relatively poor achiever or a holder of a

top position in the class versus the more comfortable middle ground of being a superior achiever with a minimum of effort.

Intra-treatment differences between the sexes by levels proved to be insignificant in all cases, though the girls of Group G surpassed the boys of both areas of the test at all levels except Level III and the boys of Groups H and J rather consistently surpassed the girls, level by level.

III. Needs and Problems

The *SRA Junior Inventory-Form S* (47) was administered as a pretest and as a posttest for the purpose of assessing changes in student needs and problems. The criterion score for each of the five areas was the change score or difference between the pretest and the posttest. A constant of 65 was added to each change score for the analysis of variance computations in order to eliminate negative numbers.

In view of the fact that the intercorrelations among the five areas obtained for a sample of 96 children in this experiment ranged from .56 to .82 with a median of .65, an analysis was carried out also of change in the total score of the five subscales combined. A constant of 170 was added to these change scores in the analysis of variance to eliminate negative numbers. It should be pointed out that negative change score means represented an expression of fewer problems and needs at the 1961 testing than at the 1960 testing and a positive score indicated a change involving more expressed problems. Thus a negative score may be interpreted to be in the more favorable direction.

The analyses of the performances of the three groups on the separate areas of this test and on the total test are presented in Tables X and XI on pages 30 and 31. There were no significant differences between over-all treatments and very few at subclass levels. However, the trend again was for Group G to be in the position of more frequently achieving both the more favorable over-all mean and the more favorable mean in the comparisons by sexes separately but with levels combined. Level-by-level comparisons indicated the performances of Groups G and H to be relatively equal and for G to be slightly superior to J.

On the other hand, though there was a tendency for all groups to show decreases more frequently than increases in numbers of expressed problems, this trend was more pronounced for Group G. Group G had a decrease in the number of expressed problems in approximately 65 percent of the means reported in Table X (page 30), whereas for Groups H and J there were decreases indicated in approximately 59 percent of the means.

TABLE X

MEANS OF CHANGE SCORES ON THE SRA JUNIOR INVENTORY—FORM S

Area	Level	Boys			Girls			Mean		
		Group G	Group H	Group J	Group G	Group H	Group J	Group G	Both Group H	Group J
School	I	– .43	– 6.57	1.00	– .14	– .57	.43	– .28	– 3.57	.72
	II	– 8.00	1.71	–11.00	– 3.57	– 6.43	11.14	– 5.80	– 2.36	.07
	III	– 1.43	– 1.14	– 2.29	–17.86	– 7.14	– 8.71	– 9.64	– 4.14	– 5.50
	IV	1.14	2.14	–10.14	4.14	4.14	– 5.86	2.64	3.14	– 8.00
	All	– 2.18	– .96	– 5.61	– 4.36	– 2.50	– .75	– 3.27	– 1.73	– 3.18
Home	I	3.43	3.00	3.00	.57	.43	.57	2.00	1.72	1.78
	II	2.29	2.86	– 5.43	2.57	.00	6.00	2.43	1.43	.28
	III	– 1.14	– 1.86	.57	– 7.86	– 2.14	– 1.29	– 4.50	– 2.00	– .36
	IV	– 2.14	2.43	– 5.29	.29	– .14	– .43	– .92	1.14	– 2.86
	All	.61	1.61	– 1.79	– 1.11	– .46	1.21	– .25	.57	– .29
Myself	I	6.00	1.29	5.86	.43	– .29	2.14	3.22	.50	4.00
	II	.29	9.29	– 2.86	– 1.29	– 2.00	11.57	– .50	3.64	4.36
	III	.43	– 1.00	.14	–18.86[a,b]	– 3.29	– 1.43	– 9.22	– 2.14	– .64
	IV	– 9.00	– 1.14	– 6.14	– 3.57	3.43	– 2.71	– 6.28	1.14	– 4.42
	All	– .57	2.11	– .75	– 5.82	– .54	2.39	– 3.20	.78	.82
People	I	2.14	5.00	6.43	– .14	– 1.43	2.00	1.00	1.78	4.22
	II	– 4.00	– 4.57	– 3.29	3.71	.57	7.43	– .14	– 2.00	2.07
	III	.00	– .43	.57	–19.00[a,b]	– 2.00	– 1.71	– 9.50	– 1.22	– .57
	IV	– 2.43	5.57	– 9.57[a]	– 2.86	.14	– 1.14	– 2.64	2.86	– 5.36
	All	– 1.07	1.39	– 1.46	– 4.57	– .68	1.64	– 2.82	.36	.09
Things in General	I	6.00	– 1.71	1.57	– .14	1.43	– 1.86	2.93	– .14	– .14
	II	–12.57	– 6.86	– 2.57	3.00	– 3.86	4.29	– 4.78	– 5.36	.86
	III	1.57	– 7.71	2.71	–15.00	– 4.29	– 5.71	– 6.72	– 6.00	– 1.50
	IV	2.29	– 5.29	– 2.71	4.57	2.29	– 3.29	3.43	– 1.50	– 3.00
	All	– .68	– 5.39	– .25	– 1.89	– 1.11	– 1.64	– 1.28	– 3.25	– .94
All Areas Combined	I	17.14	1.14	17.86	.57	– .43	3.29	8.86	.36	10.58
	II	–21.86	2.43	–25.14	4.43	–11.71	40.43	– 8.72	– 4.64	7.64
	III	– .57	–12.14	1.71	–78.57[a,b]	–19.00	–18.86	–39.57	–15.57	– 8.58
	IV	–10.14	3.71	–33.86	2.57	9.86	–13.43	– 3.78	6.78	–23.64
	All	– 3.86	– 1.22	– 9.86	–17.75	– 5.32	2.86	–10.80	– 3.27	– 3.50

[a] Different from the corresponding mean of Group H at the .05 level of significance.
[b] Different from the corresponding mean of Group J at the .05 level of significance.

TABLE XI

ANALYSES OF VARIANCE OF CHANGE SCORES ON THE SRA JUNIOR INVENTORY—FORM S

Source of Variation	df	Mean Square						F					
		School	Home	Myself	People	Things in General	All Areas Combined	School	Home	My-self	People	Things in Gen'l.	All Areas Com-bined
Treatments (A)	2	41.62	13.17	298.38	174.04	86.61	1,028.38	.16	.18	1.13	.98	.43	.33
Reading Levels (B)	3	286.71	157.75	530.86	280.40	274.40	5,716.27	1.12	2.20	2.01	1.58	1.35	1.86
Sexes (C)	1	6.10	2.88	105.29	28.34	13.15	130.38	.02	.04	.40	.16	.06	.04
AB	6	273.18	40.06	115.80	171.94	130.94	2,482.53	1.07	.56	.44	.97	.65	.81
AC	2	211.82	112.17	258.33	169.20	145.90	2,535.54	.83	1.56	.98	.95	.72	.83
BC	3	500.11	92.71	290.12	479.55	477.64	7,644.21	1.96	1.29	1.10	2.70*	2.36	2.49
ABC	6	256.53	58.25	233.75	128.62	164.27	2,807.34	1.01	.81	.89	.73	.81	.91
Within-cells	141	255.22	71.82	263.92	177.36	202.52	3,072.81						

	School	Home	Myself	People	Things in General	All Areas Combined
Total of Sums of Squares	42,037.72	11,721.42	42,992.27	29,805.79	33,059.88	512,345.09

* Significant at the .05 level.

Only one significant F-ratio resulted from the analysis of variance. In the area of problems concerned with people there was a significant interaction between reading levels and sexes which reflected the inconsistencies in the direction of changes of the girls and the boys particularly at Levels II and III (see Table X, page 30).

The analysis of total change scores for all five areas combined did not produce results which were different to any great degree from the separate analyses of the areas, but the composite differences are perhaps easier to observe. Though not significantly greater, the mean decrease in number of problems expressed by Group G was three times the mean decrease expressed by either of the other groups. Also, Group G showed a decrease at subclass levels more often than did either of the other two groups.

Intra-treatment comparisons of levels indicated again that there was little relationship between level in reading and change in numbers of expressed problems for the subjects in this study. Level IV in Group J and Level III in both Groups G and H made more favorable changes on most areas of the test than any other level with the differences between I and III of Group G on three out of the five areas of the test reaching significance. Again the performance of Level I was observed to be generally the least favorable, which raises a second time the question of increasing problems being associated with high academic status.

IV. Interests

The *What I Like To Do* (51) inventory was the instrument employed to assess changes in interests over the period of the study. Three areas of the inventory, Social Studies, Quiet Play, and Science, were judged to be most relevant to the present investigation and were selected for analysis. All change scores were increased by 65 for the analyses of variance in order to eliminate negative numbers from the computations.

Data relative to changes measured by the inventory are presented in Tables XII and XIII on pages 33 and 34. It can be seen that there were only ten instances of increased interests in all 135 means reported in Table XII and that in every area the treatment groups as wholes and by separate sexes demonstrated fewer interests in 1961 than in the year preceding.

This is in keeping with the general trend in the norms for decreased interests with progress through the grades, but the decreases are greater than in the normative population. Median posttest scores of both sexes in all three treatments fell below the medians of the norms group in all three areas analyzed. A sample from the general population from which

TABLE XII

MEANS OF CHANGE SCORES ON SELECTED PARTS OF THE WHAT I LIKE TO DO INVENTORY

Area	Level	Mean Boys			Girls			Both		
		Group G	Group H	Group J	Group G	Group H	Group J	Group G	Group H	Group J
Social Studies	I	- 4.00	-6.10	- 6.29	- 1.57	- 4.00	- 6.00	- 2.78	- 5.05	- 6.14
	II	- 3.71	-6.10	- 8.00	- 6.71	- 6.10	- 3.43	- 5.21	- 6.10	- 5.72
	III	1.72*	-9.43	- 4.14	- 9.29	- 1.29	- 3.86	- 3.78	- 5.36	- 4.00
	IV	3.57	-2.14	- 1.00	- 1.86	- 3.71	- .57	.86	- 2.92	- .78
	All	- .69*	-5.94	- 4.86	- 4.86	- 3.78	- 3.48	- 2.73	- 4.56	- 4.16
Quiet Play	I	- 1.71	-3.14	2.43	- 3.29	- 3.43	- 6.10	- 2.50	- 3.28	- 1.84
	II	- 4.00	-5.57	- 4.57	- 2.57	- 4.14	- 1.43	- 3.28	- 4.86	- 3.00
	III	- 2.57	-1.00	- .86	- 1.43	- 2.00	- .86	- 2.00	- 1.50	- .86
	IV	.57	- .29	- .71	- 3.14	.57	- 3.43	- 1.28	.14	- 2.07
	All	- 1.93	-2.50	- .93	- 2.61	- 2.55	- 2.96	- 2.27	- 2.55	- 1.94
Science	I	- 1.43	3.43	- 5.71	- 4.00	-11.29	- 4.14	- 2.72	- 3.93	- 4.92
	II	-12.71	-7.71	-15.57	- 9.71	- 7.14	- .29	-11.21	- 7.42	- 7.93
	III	- .71	-9.14	- 4.00	-11.00	- 9.29	- 5.71	- 5.86	- 9.22	- 4.86
	IV	7.43	-6.00	2.57	- 8.98	- 9.71	- 2.86	- .72	- 7.86	- .14
	All	- 1.86	-4.86	- 5.68	- 8.39	- 9.36	- 3.25	- 5.13	- 7.11	- 4.48

* Different from the corresponding mean of Group H at the .05 level of significance.

TABLE XIII

ANALYSIS OF VARIANCE OF CHANGE SCORES ON SELECTED PARTS OF THE *WHAT I LIKE TO DO* INVENTORY

Source of Variation	df	Mean Square			F*		
		Social Studies	Quiet Play	Science	Social Studies	Quiet Play	Science
Treatments (A)	1	66.67	2.70	105.93	.61	.08	.37
Reading Levels (B)	3	177.08	59.45	307.91	1.62	1.78	1.08
Sexes (C)	1	2.15	28.34	545.72	.02	.85	1.91
AB	3	13.71	13.54	100.70	.13	.41	.35
AC	1	172.17	18.50	309.18	1.58	.55	1.08
BC	3	28.78	58.01	427.88	.26	1.78	1.50
ABC	3	79.52	28.25	142.10	.72	.79	.50
Within-cells	140	109.08	33.40	285.74			
		Social Studies		Quiet Play		Science	
Total of Sums of Squares		17,050.83		5,340.80		60,243.71	

* All values fall below the .05 level of significance.

subjects for this research were selected was also studied and a mean decrease greater than the decrease demonstrated by the norms population seemed to be characteristic of children generally in this geographic area.

A more detailed examination of the means given in Table XII (page 33) indicates that in general the decreases of the Group C boys were smaller than the decreases of the boys of Groups H and J and that the J girls tended to show smaller decreases than the C or H girls. Over-all the C Group showed less decrease than H on all three areas but less decrease than J only in Social Studies. Though none of these differences in themselves were significant, the consistency of the relative performances of groups may be worthy of note.

Comparisons of H and J revealed that J fairly consistently demonstrated less decrease in interests than H for areas separately and over-all. Actually, Group J tended to perform more nearly like the heterogeneous sample drawn from the same population than did the children in Group H who had been notified of their intellectual standing. It would almost appear that becoming aware of superior intellectual ranking without the benefit of the stimulation of the special session may have resulted in a certain amount of dissatisfaction and a somewhat blasé attitude toward the usual activities in the classroom.

Though Level IV generally decreased least in interests, there were no significant intra-treatment differences of note either between levels or between boys and girls.

V. Reputation

Subjects in this study were measured on their reputations in their respective classrooms by means of a "Sociometric-Choice" rating scale constructed for this investigation. It was found best to consider the

total number of times a student was chosen by his classmates on all fifteen items of the test as the raw score for an individual, since the correlation between the intellectual and personal-social part scores indicated that they were measuring the same thing to a large extent. These raw scores were then converted to standard scores with a mean of 500 and a standard deviation of 100. Students were rated both at pretest time and at posttest time and the change in standard score units served as the criterion. For the analysis of variance negative scores were eliminated by the addition of 250 to each criterion score.

It can be seen from the data in Table XIV below that the students in all three groups tended to show over-all gains in reputation and that

TABLE XIV

MEANS OF CHANGE SCORES ON A SOCIOMETRIC-CHOICE RATING SCALE

Sex	Level	Mean*		
		Group G	Group H	Group J
Boys	I	10.50	22.14	-24.29
	II	24.71	3.00	47.00
	III	- 3.29	- 8.43	19.71
	IV	25.43	31.29	20.14
	All	21.08	14.25	15.64
Girls	I	11.43	- 6.43	- 5.14
	II	- 5.43	15.14	25.14
	III	.50	- 6.50	.14
	IV	1.14	- 5.71	25.00
	All	5.30	- .00	13.78
Both	I	25.04	13.50	-14.71
	II	10.04	7.57	36.07
	III	- 1.33	- 7.04	9.92
	IV	13.29	13.79	27.57
	All	12.09	8.04	14.71

* All differences between means fall below the .05 level of significance.

the groups were not significantly different from one another. The analysis of variance (see Table XV, page 30) yielded no *F*-ratios which reached the required level of significance. Though members in Group G did not demonstrate superior gains in reputation, it might be worthy to note that neither did they, as a consequence of being singled out for special attention, develop any undesirable personality traits which resulted in a loss of standing in the eyes of their classmates.

The study of intra-treatment changes in reputation likewise yielded nothing of significance. There were no significant differences between any pairs of levels or between boys and girls in any treatment nor were the superiorities of any level or any sex consistent from treatment to treatment.

TABLE XV

ANALYSIS OF VARIANCE OF CHANGE SCORES ON A SOCIOMETRIC-CHOICE RATING SCALE

Source of Variation	df	Mean Square	F*
Treatments (A)	2	949.22	.18
Reading Levels (B)	3	3,150.05	.58
Sexes (C)	1	6,132.29	1.14
AB	6	3,456.56	.65
AC	2	1,153.04	.21
BC	3	276.05	.05
ABC	6	2,244.04	.42
Within-cells	141	5,398.03	
Total of Sums of Squares			814,427.74

* All values fell below the .05 level of significance.

Chapter 5

Summary and Implications

I. Summary

The purpose of this investigation was to devise a special summer curriculum for a group of rapid learning children and then to study the effects of that curriculum on certain facets of the achievement and adjustment of those children approximately one school year later. The investigation was designed in such a way that the children who participated in the experimental program (Group G) could be compared with the children in two other groups, one (Group H) in which the students had been notified that they had scored high enough to be eligible for the special session but had not been chosen in the random selection and a second (Group J) in which the students had received no notification that they were eligible.

The instruments used to measure achievement were the *Iowa Tests of Basic Skills* and three locally adapted tests entitled "Library Research," "Critical Thinking," and "Expression." Instruments employed to give indications of changes in adjustment and security were the *SRA Junior Inventory-Form S* and the *Institute of Child Study Security Test*. The

What I Like To Do inventory was administered in order to study changes in the children's interests, and a locally prepared sociometric-choice rating instrument was used to obtain a measure of changes in reputation in the eyes of the peer group.

The main hypotheses being tested in this research were that there would be no differences between any two of the three treatment groups in achievement, or in changes in security, in expressed problems, in interests, or in reputation among peers. Logically, differences between the group which attended the special summer session and the groups which did not attend were of primary interest. However, since considerable emphasis was given in the special session to the development of proper attitudes toward the possession of superior ability and since one control group had been notified they were of superior ability but had not received whatever benefit might accrue from the summer session experiences, comparisons between this notified control and the control who were not aware of their intellectual rank were also of interest.

The design of the study and the nature of the data also made possible certain intra-group comparisons which were of secondary interest. Differences among levels within treatment groups and differences between sexes within treatment groups became matters for analysis and study.

Teacher-pupil planning was emphasized in the special program and the curriculum was planned around central units in each classroom the first part of the term and around the children's interests the latter part of the term. Each child did research on a chosen topic and skills pertaining to the use of the library and the preparation of a research paper were taught as the needs arose. Problems of human relations, activities to develop redefinition abilities and ideational fluency, and practice in setting up goals and evaluating progress toward those goals were included in the program. Some attempts were made to identify specific weaknesses in reading ability and practice periods for improving rate and comprehension were set up several times per week.

Briefly the findings were as follows: –

1. Differences in the academic areas generally favored the experimental group and thus the null hypothesis may be rejected in some instances. Treatment Group G was significantly superior overall to J (unnotified control) in reading and to both H (notified control) and J in library research, and at no time was either of the other groups significantly superior to G. The mean performance of Group G was higher than that of H on all eight scholastic variables (ITBS and locally adapted tests) and higher than J on five of the eight. Essentially the same situation held for subclass and subgroup comparisons. At no time was any subclass or subgroup of either

Group H or Group J significantly superior to the comparable subclass or subgroup of G. Though statistically significant differences between means were not numerous, the chi-square test revealed that the number of times that Group G possessed means superior to Treatment Group H was greater than chance at the .05 level of significance.

2. The null hypothesis of no significant differences in social and emotional security between any two of the treatment groups can be accepted. There were no significant differences over-all or between any subclasses or subgroups.
3. The null hypothesis can be retained with respect to changes in numbers of expressed needs and problems. The children in Group G gave no indication that they felt they had more problems after the special program than they had expressed before; in fact, their decrease was greater than the decreases for either Group H or Group J, though not significantly so. There were no significant over-all differences between any of the groups and only a few scattered significant subclass differences.
4. There were no significant differences in changes in interests between the treatments over-all and only one between subgroups (all boys of G and boys of H in Social Studies), so the null hypothesis is retained with respect to comparisons with the *What I Like To Do* inventory. The general trend was for greater decreases than in the norms population throughout all three treatments but not to any substantial degree and less so in Group G than in either of the other two groups.
5. The null hypothesis can be accepted with respect to changes in reputation, likewise, for there were no significant intertreatment differences. Apparently the research program caused very little change in the way the children in the study were looked upon by their peers.

All-in-all, there was a definite trend for Experimental Group G to exceed both Group H and Group J though not always at significant levels. When considering the total number of nineteen over-all treatment comparisons between Groups G and H, Group G was found to possess a significantly greater proportion of the superior means (.01 level). Group G also possessed the majority of the superior means in the comparisons with Group J, but the difference in proportions failed to reach significance.

In comparisons of Treatments G and H level-by-level, Group G was found to possess the majority of superior means at every level and in the comparisons with Group J to possess the majority of superior means at Levels I and III. The chi-square test revealed that the number of times

that G was superior to H in the level-by-level comparisons was greater than chance at the .01 level of significance. Though G exceeded J a majority of times in the level-by-level comparisons, and J exceeded H also a majority of the times, in neither of these situations was either group found to be favored significantly.

Whether comparisons under consideration were of significant differences between means or of the significant number of times in possession of the favorable mean, or whether they were of over-all treatments, of levels with sexes combined or separated, or of levels combined with sexes separately, Group G was found to be superior to Group H. Though not frequently at significant levels, Group G was also superior to Group J in the majority of the comparisons with that group.

Comparisons which involved Groups H and J seemed to indicate that perhaps J was superior to H but not to the extent that G was superior to either H or J. In other words, there were more and greater differences between G and H or G and J than between H and J.

Intra-group comparisons were in keeping with expectations. The various levels performed on tests of an academic nature generally in keeping with their rank in reading achievement and on tests of non-academic nature there were very few significant differences between levels.

Likewise nothing of note resulted from the intra-treatment comparisons of the sexes level-by-level. There were a few scattered significant differences but they were neither predominantly within any one group, at any one level, in favor of one sex, or on one type of measure. Since the boys and the girls had been well-matched initially within levels as well as over-all, this situation also was in keeping with that which was hypothesized.

II. Implications of This Investigation

The present investigation continues to emphasize the fact that rapid learning children can be helped to achieve higher academically than they are currently achieving in their regular school situations and that a special summer session is a possible way to provide some of this help. The experimental group did achieve some significant academic superiorities even though the extra session was very short and there was no effort on the part of investigating personnel to maintain or to reinforce the summer learnings during the ensuing school year. If the students could gain enough in only thirty-nine half-day sessions with no further follow-up that one year later they were able to demonstrate the superiorities they did, it would seem reasonable that more striking results might be obtained with some sort of continuing program in the nature of a coordinating teacher, weekly seminars, or some other method by which

the students would be aided in retaining and supplementing the instruction of the summer.

Another implication of the present study would seem to be related to the finding that Group G, in level-by-level comparisons, attained a significantly (.05 level) greater number of superior means than Group H in the areas other than academic. This perhaps points out that if children in fifth and sixth grades, even though some of them recognize their own superior abilities without being told in so many words, are going to be notified that they do possess more ability than most of their classmates as those in Group H were informed, they should in addition have help in knowing how to adjust to the knowledge of their superiority in an acceptable fashion.

This superiority of G in the areas other than the academic also suggests that special attention and provision for the gifted need not create personality problems for them nor render them unacceptable to their classmates as some have claimed might be the case. Whatever method is used to make special provision for the gifted should be accompanied by some specific guidance to help them view their abilities realistically and with acceptable modesty. To be most effective in our modern society people of superior ability generally must work in harmony with others of both equal and lesser abilities. Thus it would not be advantageous to concentrate solely upon improvement in academic areas and to neglect the development of desirable social attitudes and skills.

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